

**L8(4.5) Factoring Special Quadratics (Perfect Square Trinomials & Differences of 2 Squares)**

## 1. Perfect Square Trinomial

(a)  $a^2 + 2ab + b^2 = (a + b)(a + b)$

$= (a + b)^2$

(b)  $a^2 - 2ab + b^2 = (a - b)(a - b)$

$= (a - b)^2$

Note:

- I. Standard methods, such as **alge-tiles** or **decomposition (SPI or MAN)** will also work, but may take longer.
- II. It is critical to check the **2ab** term to make sure you have a perfect square, or verify your final answer by expanding.

Remember

1

4

9

16

25

36

49

64

81

100

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Ex.1 Factor using a pattern (if possible)

(a)  $x^2 + 6x + 9$

$$= (x+3)(x+3)$$

$$= (x+3)^2$$

M: 9  
A: 6  
N: 3, 3



(b)  $4x^2 - 12x + 9$

$$= (2x-3)(2x-3)$$

$$= (2x-3)^2$$

M: 36  
A: -12  
N: -6, -6

(c)  $25x^2 - 30x + 9$

$$= (5x-3)(5x-3)$$

$$= (5x-3)^2$$

M: 225  
A: -30  
N: -15, -15

Ex.1 Factor using a pattern (if possible)

(a)  $x^2 + 12x + 36$

$$= (x+6)(x+6)$$

$$= (x+6)^2$$

(b)  $x^2 + 13x + 36$

$$= x^2 + 4x + 9x + 36$$

$$= x(x+4) + 9(x+4)$$

$$= (x+9)(x+4)$$

(c)  $4x^2 - 20x + 25$

$$= (2x-5)(2x-5)$$

$$= (2x-5)^2$$

M = 36

A = 13

N = 4, 9

$$\begin{array}{r} 36 \\ 1 \times 36 \\ 2 \times 18 \\ 3 \times 12 \\ 4 \times 9 \end{array}$$

## 2. Difference of Squares

$$a^2 - b^2 = (a + b)(a - b)$$

$$= (a - b)(a + b)$$

(the order of the binomials does not matter)

Examples:

(a)  $4x^2 - 9$

$$= (2x+3)(2x-3)$$

(b)  $9x^2 - 16$

$$= (3x+4)(3x-4)$$

Note: difference of squares

$$\begin{array}{l} 4x^2 + 9 \\ (2x+3)(2x+3) \\ (2x-3)(2x-3) \end{array}$$

Ex.2 Factor

(a)  $k^2 - 121$ 

$$(k+11)(k-11)$$

(b)  $81m^2 - 144$ 

$$(9m+12)(9m-12)$$

$$3(3m+4) \times 3(3m-4)$$

$$9(3m+4)(3m-4)$$

Ex.3 Factor using a special pattern:

(a)  $25d^2 - 144$ 

$$=(5d+12)(5d-12)$$

(b)  $16x^2 + 24xy + 9y^2$ 

$$=(4x+3y)(4x+3y)$$

$$=(4x+3y)^2$$

(c)  $18p^2q - 60pq + 50q$ 

$$=2q(9p^2-30p+25)$$

(d)  $98a^2 - 32b^2$ 

$$=2(49a^2-16b^2)$$

$$=2q(3p-5)(3p-5) = 2(7a-4b)(7a+4b)$$

$$=2q(3p-5)^2$$

Ex.4: Factor  $x^2 - 10x + 25 - w^2$ 

$$=(x-5)(x-5) - w^2 \quad \text{let } a = (x-5)$$

$$=(x-5)^2 - w^2$$

$$=a^2 - w^2$$

$$=(a-w)(a+w)$$

$$=(x-5-w)(x-5+w)$$

Assigned Work:

p. 230-231 # 3bc, 5, 6, 7, 10, 11, 14